CLAIMS

- 1. (Currently amended) A medical article comprising an implantable substrate having a coating, the coating including a polymeric product of a reaction between a first reagent, a second reagent, and a third reagent, wherein:
- (a) the first reagent is selected from a group consisting of compounds having formulae (1), (2), (3), and (4):

$$R_1$$
 O O R_1 | | (1)

$$HO-X-OH$$
 (3)

$$H_2N-Y-NH_2 \tag{4}$$

(b) the second reagent is selected from a group consisting of compounds having formulae (5), (6), (7), and (8):

O O
$$\| \|$$
 $\|$ (6) HO-R₂-C-NH-R₄-NH-C-R₂-OH

$$HO-R_4-OH$$
 (7)

 $H_2N-R_4-NH_2$

(8)

(c) the third reagent is a dicarboxylic acid having the formula (9):

wherein:

R₁ is hydrogen, methyl, *iso*-propyl, *sec*-butyl; *iso*-butyl, or benzyl group;

R₂ is methylene, methylmethylene, *n*-propylene, *iso*-propylene, ethylmethylene, *n*-butylene, *iso*-butylene, *sec*-butylene, or *n*-amylene group;

 R_3 is a straight chained or branched aliphatic alkylene group C_nH_{2n} , wherein n is an integer between 2 and 12;

R₄ is a moiety derived from a compound selected from a group consisting of poly(ethylene glycol), poly(propylene glycol), random poly(ethylene glycol-co-propylene glycol), poly(ethylene glycol)-block-poly(propylene glycol), hyaluronic acid, poly(2-hydroxyethyl methacrylate), poly(3-hydroxypropylmethacrylamide), poly(styrene sulfonate), and poly(vinyl pyrrolidone), and cellulosics;

X is a straight chained or branched aliphatic alkylene group C_nH_{2n} , wherein n is an integer between 2 and 12; and

Y is a straight chained or branched aliphatic alkylene group C_nH_{2n} , wherein n is 1, 2, or 5.

- 2. (Original) The medical article of Claim 1, wherein the implantable substrate is a stent.
- 3. (Original) The medical article of Claim 1, wherein the compound of formula (1) is a diol-diamine, the diol-diamine is a product of condensation of an amino acid and a diol.

4. (Original) The medical article of Claim 3, wherein the amino acid has the formula (10):

$$H_2N$$
— CHR_1 — $COOH$. (10)

- 5. (Original) The medical article of Claim 3, wherein the amino acid is selected from a group consisting of glycine, alanine, valine, isoleucine, leucine, and phenyl alanine.
- 6. (Original) The medical article of Claim 3, wherein a diol is selected from a group consisting of ethylene glycol, 1,3-propanediol, 1,4-butane diol, 1,5-pentanediol, 1,6-hexanediol, 1,7-heptanediol, 1,8-octanediol, 1,9-nonanediol, 1,10-decanediol, 1,11-undecanediol, and 1,12-dodecanediol.
- 7. (Withdrawn) The medical article of Claim 1, wherein the compound of formula (2) is an amidediol, the amidediol is a product of condensation of a hydroxy acid and a diamine.
- 8. (Withdrawn) The medical article of Claim 7, wherein the hydroxy acid has the formula (11):

$$HO-R_2-COOH.$$
 (11)

- 9. (Withdrawn) The medical article of Claim 7, wherein the hydroxy acid is selected from a group consisting of glycolic acid, lactic acid, β -hydroxybutyric acid, α -hydroxyvaleric acid, and ϵ -hydroxycaproic acid.
- 10. (Withdrawn) The medical article of Claim 7, wherein the diamine is selected from a group consisting of putrescine, 1,2-ethanediamine, and cadavarene.

- 11. (Withdrawn) The medical article of Claim 1, wherein the compound of formula (3) is selected from a group consisting of ethylene glycol, 1,3-propanediol, 1,4-butane diol, 1,5-pentanediol, 1,6-hexanediol, 1,7-heptanediol, 1,8-octanediol, 1,9-nonanediol, 1,10-decanediol, 1,11-undecanediol, and 1,12-dodecanediol.
- 12. (Withdrawn) The medical article of Claim 1, wherein the compound of formula (4) is selected from a group consisting of putrescine, 1,2-ethanediamine, and cadavarene.
- 13. (Original) The medical article of Claim 1, wherein the compound of formula (5) is a PEG-diester-diamine conjugate, the conjugate is a product of condensation of an amino acid and poly(ethylene glycol).
- 14. (Original) The medical article of Claim 13, wherein the amino acid has the formula (10):

(10)

- 15. (Original) The medical article of Claim 13, wherein the amino acid is selected from a group consisting of glycine, alanine, valine, isoleucine, leucine, phenyl alanine, tyrosine, serine, and glutamic acid.
- 16. (Withdrawn) The medical article of Claim 1, wherein the compound of formula (6) is a PEG-amidediol conjugate, the conjugate is a product of condensation of a hydroxy acid and PEG-diamine.

17. (Withdrawn) The medical article of Claim 16, wherein the hydroxy acid has the formula (11):

$$HO-R_2-COOH.$$
 (11)

- 18. (Withdrawn) The medical article of Claim 17, wherein the hydroxy acid is selected from a group consisting of glycolic acid, lactic acid, β -hydroxybutyric acid, α -hydroxyvaleric acid, and ϵ -hydroxycaproic acid.
- 19. (Currently amended) A medical article comprising an implantable substrate having a coating, the coating including a copolymer having a general formula (12) or (13):

$$-[M-P]_m-[M-Q]_n-$$
 (12)

$$-[M_1-P]_p-$$
 (13)

wherein:

M is a moiety represented by the structure having the formula (14)

P is a moiety selected from a group consisting of structures having the formulae (15), (16), (17), and (18):

$$R_1$$
 O O R_1 | | | (15)

$$-O-X-O-$$
 (17)

$$-NH-Y-NH-$$
 (18)

Q is a moiety selected from a group consisting of structures having the formulae (19), (20), and (21)

$$R_1$$
 O O R_1 | | (19)

$$\begin{array}{c|ccccc}
O & O \\
\parallel & \parallel \\
-O-R_2-C-NH-Z-NH-C-R_2-O-
\end{array}$$
(20)

M₁ is a moiety represented by the structure having the formula (22):

R₁ is hydrogen, methyl, *iso*-propyl, *sec*-butyl; *iso*-butyl, or benzyl group;

R₂ is methylene, methylmethylene, *n*-propylene, *iso*-propylene, ethylmethylene, *n*-butylene, *iso*-butylene, *sec*-butylene, or *n*-amylene group;

 R_3 is a straight chained or branched aliphatic alkylene group C_nH_{2n} , wherein n is an integer between 2 and 12;

X is a straight chained or branched aliphatic alkylene group $C_n H_{2n}$, wherein n is an integer between 2 and 12;

Y is a straight chained or branched aliphatic alkylene group C_nH_{2n} , wherein n is 1, 2, or 5;

Z is a moiety derived from a compound selected from a group consisting of poly(ethylene glycol), poly(propylene glycol), random poly(ethylene glycol-co-propylene glycol), poly(ethylene glycol)-block-poly(propylene glycol), hyaluronic acid, poly(2-hydroxyethyl methacrylate), poly(3-hydroxypropylmethacrylamide), poly(styrene sulfonate), and poly(vinyl pyrrolidone, and cellulosics; and

m, n, and p are integers where the value of m is between 5 and 1,800, the value of n is between 1 and 800 and the value of p is between 4 and 1,500.

20. (Original) The medical article of Claim 19, wherein the polymer is selected from a group consisting of copolymers of formulae (23), (24), (25), (26), (27), (28), (29), (30), (31), (32), (33), (34), (35), (36), (37), (38), (39), (40), (41), (42), and (43):

(23)

$$\begin{bmatrix} O & O & CH_3 & O & O & CH_3 \\ - C - CH_2 \end{bmatrix}_2 C - NH - CH - C - O - CH_2 \end{bmatrix}_4 O - C - CH - NH$$

$$= \begin{bmatrix} O & O & CH_3 & O & O & CH_3 \\ - C - CH_2 \end{bmatrix}_2 C - NH - CH - C - O - PEG_{300} - O - C - CH - NH \\ - O - O - C - CH - NH \end{bmatrix}_{0.47}$$

(24)

(25)

$$\begin{bmatrix} CH_3 - CH - CH_3 & CH_3 - CH - CH_3 \\ O & O & CH_2 & O & O & CH_2 \\ C - CH_2 - C - NH - CH - C - O - CH_2 - O - C - CH - NH - CH_2 - CH_2$$

(26)

$$\begin{bmatrix} CH_3-CH-CH_3 & CH_3-CH-CH_3 \\ O & O & CH_2 & O & O & CH_2 \\ C-CH_2-8 & C-NH-CH-C-O-CH_2-6 & CH-NH-M \\ C-CH_2-8 & C-O-CH-C-NH-PEG_{600}-NH-C-CH-O-M \\ m & C-CH_2-8 & C-O-CH-C-NH-PEG_{600}-NH-C-C-CH-O-M \\ m & C-CH_2-8 & C-O-CH-C-NH-PEG_{600}-NH-C-C-CH-O-M \\ m & C-CH_2-8 & C-O-CH-C-NH-PEG_{600}-NH-C-C-C-NH-PEG_{600}-NH-C-C-C-NH-PEG_{600}-NH-C-C-C-NH-PEG_{600}-NH-C-C-C-NH-PEG_{600}-NH-C-C-C-NH-PEG_{600}-NH-C-C-C-NH-PEG_{600}-NH-C-C-C-NH-PEG_{600}-NH-C-C-C-NH-PEG$$

(27)

28)

(29)

$$= \underbrace{\begin{bmatrix} O & O & CH_3 & O & CH_3 \\ -C & -CH_2 \end{bmatrix}_{8}^{C} C - O - CH - C - NH + \underbrace{CH_2}_{4}^{N}N + -C - CH - O - \underbrace{\begin{bmatrix} O & CH_3 \\ -C & -CH_2 \end{bmatrix}_{8}^{C} C - O - PEG_{300} - O - \underbrace{CH_2}_{1}^{N} C - \underbrace{CH_2}_{2}^{N} C - O - CH_{2}^{N} C - \underbrace{CH_2}_{1}^{N} C - \underbrace{CH_2}_{1}^{N}$$

(30)

(31)

(34)

(35)

(36)

(37)

$$\begin{bmatrix} CH_{3}-CH-CH_{3} & CH_{3}-CH-CH_{3} \\ O & O & CH_{2} & O & O & CH_{2} \\ || & || & || & || & || & || \\ -C-PEG_{1000}-C-NH-CH-C-O-CH_{2}-O-C-CH-NH-D_{n} \end{bmatrix}$$

(38)

(39)

$$= \begin{bmatrix} O & O & CH_3 & O & O & CH_3 \\ \parallel & \parallel & \parallel & \parallel & \parallel & \parallel \\ C - (CH_2)_4 & C - NH - CH - C - O - (CH_2)_4 & O - C - CH - NH \\ \parallel & \parallel & \parallel & \parallel & \parallel & \parallel & \parallel \\ 0.37 & C - (CH_2)_4 & C - NH - CH - C - O - PEG_{300} - O - C - CH - NH \\ 0.67 & 0 & CH_3 & O & O & CH_3 \\ \parallel & \parallel & \parallel & \parallel & \parallel & \parallel & \parallel \\ C - (CH_2)_4 & C - NH - CH - C - O - PEG_{300} - O - C - CH - NH \\ 0.67 & 0 & CH_3 & O & O & CH_3 \\ \parallel & \parallel & \parallel & \parallel & \parallel & \parallel & \parallel \\ 0.00 & 0 & CH_3 & O & O & CH_3 \\ \parallel & \parallel & \parallel & \parallel & \parallel & \parallel & \parallel \\ 0.00 & 0 & CH_3 & O & O & CH_3 \\ \parallel & \parallel & \parallel & \parallel & \parallel & \parallel & \parallel \\ 0.00 & 0 & CH_3 & O & O & CH_3 \\ \parallel & \parallel & \parallel & \parallel & \parallel & \parallel \\ 0.00 & 0 & CH_3 & O & O & CH_3 \\ \parallel & \parallel & \parallel & \parallel & \parallel & \parallel \\ 0.00 & 0 & CH_3 & O & O & CH_3 \\ 0.00 & 0 & 0 & CH_3 & O & O & CH_3 \\ 0.00 & 0 & 0 & CH_3 & O & O & CH_3 \\ 0.00 & 0 & 0 & CH_3 & O & O & CH_3 \\ 0.00 & 0 & 0 & CH_3 & O & O & CH_3 \\ 0.00 & 0 & 0 & CH_3 & O & O & CH_3 \\ 0.00 & 0 & 0 & CH_3 \\ 0.00 & 0 & 0 & CH_3 & O & CH_3$$

(40)

(41)

(42)

(43)

- 21. (Currently amended) A method for fabricating a medical article, the method including synthesizing a copolymer and forming a coating based on the copolymer on at least a portion of an implantable substrate, the synthesizing of the copolymer including reacting a first reagent with a second reagent and with a third reagent, wherein:
- (a) the first reagent is selected from a group consisting of compounds having formulae (1), (2), (3), and (4):

O O
$$\| \|$$
 $\|$ (2) HO-R₂-C-NH-Y-NH-C-R₂-OH

$$HO-X-OH$$
 (3)

$$H_2N-Y-NH_2 \tag{4}$$

(b) the second reagent is selected from a group consisting of compounds having formulae (5), (6), (7), and (8):

O O
$$\| \|$$
 $\|$ (6) HO-R₂-C-NH-R₄-NH-C-R₂-OH

$$HO-R_4-OH$$
 (7)

$$H_2N-R_4-NH_2$$
 (8)

(c) the third reagent is a dicarboxylic acid having the formula (9):

wherein:

 R_1 is hydrogen, methyl, iso-propyl, sec-butyl; iso-butyl, or benzyl group;

R₂ is methylene, methylmethylene, *n*-propylene, *iso*-propylene, ethylmethylene, *n*-butylene, *iso*-butylene, *sec*-butylene, or *n*-amylene group;

 R_3 is a straight chained or branched aliphatic alkylene group C_nH_{2n} , wherein n is an integer between 2 and 12;

R₄ is a moiety derived from a compound selected from a group consisting of poly(ethylene glycol), poly(propylene glycol), random poly(ethylene glycol-co-propylene glycol), poly(ethylene glycol)-block-poly(propylene glycol), hyaluronic acid, poly(2-hydroxyethyl methacrylate), poly(3-hydroxypropylmethacrylamide), poly(styrene sulfonate), and-poly(vinyl pyrrolidone), and cellulosics;

X is a straight chained or branched aliphatic alkylene group C_nH_{2n} , wherein n is an integer between 2 and 12;

Y is a straight chained or branched aliphatic alkylene group C_nH_{2n} , wherein n is 1, 2, or 5.

- 22. (Original) The method of Claim 21, wherein the implantable substrate is a stent.
- 23. (Original) The method of Claim 21, wherein the molar ratio between the first reagent, the second reagent, and the third reagent is about 1:1:2.
- 24. (Original) The method of Claim 21, wherein the compound of formula (1) is a diol-diamine, the diol-diamine is a product of condensation of an amino acid and a diol.
- 25. (Withdrawn) The method of Claim 24, wherein the amino acid has the formula (10):

$$H_2N$$
— CHR_1 — $COOH$. (10)

26. (Original) The method of Claim 24, wherein the amino acid is selected from a group consisting of glycine, alanine, valine, isoleucine, leucine, and phenyl alanine.

- 27. (Original) The method of Claim 24, wherein a diol is selected from a group consisting of ethylene glycol, 1,3-propanediol, 1,4-butane diol, 1,5-pentanediol, 1,6-hexanediol, 1,7-heptanediol, 1,8-octanediol, 1,9-nonanediol, 1,10-decanediol, 1,11-undecanediol, and 1,12-dodecanediol.
- 28. (Withdrawn) The method of Claim 21, wherein the compound of formula (2) is an amidediol, the amidediol is a product of condensation of a hydroxy acid and a diamine.
- 29. (Withdrawn) The method article of Claim 28, wherein the hydroxy acid has the formula (11):

$$HO-R_2-COOH.$$
 (11)

- 30. (Withdrawn) The method of Claim 28, wherein the hydroxy acid is selected from a group consisting of glycolic acid, lactic acid, β -hydroxybutyric acid, α -hydroxyvaleric acid, and ϵ -hydroxycaproic acid.
- 31. (Withdrawn) The method of Claim 28, wherein the diamine is selected from a group consisting of putrescine, 1,2-ethanediamine, and cadavarene.
- 32. (Withdrawn) The method of Claim 21, wherein the compound of formula (3) is selected from a group consisting of ethylene glycol, 1,3-propanediol, 1,4-butane diol, 1,5-pentanediol, 1,6-hexanediol, 1,7-heptanediol, 1,8-octanediol, 1,9-nonanediol, 1,10-decanediol, 1,11-undecanediol, and 1,12-dodecanediol.
- 33. (Withdrawn) The method of Claim 21, wherein the compound of formula (4) is selected from a group consisting of putrescine, 1,2-ethanediamine, and cadavarene.

- 34. (Original) The method of Claim 21, wherein the compound of formula (5) is a PEG-diester-diamine conjugate, the conjugate is a product of condensation of an amino acid and poly(ethylene glycol).
- 35. (Withdrawn) The method of Claim 34, wherein the amino acid has the formula (10):

$$H_2N$$
— CHR_1 — $COOH$. (10)

- 36. (Withdrawn) The method of Claim 34, wherein the amino acid is selected from a group consisting of glycine, alanine, valine, isoleucine, leucine, phenyl alanine, tyrosine, serine, and glutamic acid.
- 37. (Withdrawn) The method of Claim 21, wherein the compound of formula (6) is a PEG-amidediol conjugate, the conjugate is a product of condensation of a hydroxy acid and PEG-diamine.
- 38. (Withdrawn) The method of Claim 37, wherein the hydroxy acid has the formula (11):

$$HO-R_2-COOH.$$
 (11)

- 39. (Withdrawn) The method of Claim 37, wherein the hydroxy acid is selected from a group consisting of glycolic acid, lactic acid, β -hydroxybutyric acid, α -hydroxyvaleric acid, and ϵ -hydroxycaproic acid.
- 40. (Currently amended) A method for fabricating a medical article, the method including synthesizing a copolymer and forming a coating based on the copolymer on at

least a portion of an implantable substrate, wherein the copolymer has a general formula (12) or (13):

$$-[M-P]_m-[M-Q]_n-$$
 (12)

$$-[M_1-P]_p-$$
 (13)

wherein:

M is a moiety represented by the structure having the formula (14)

P is a moiety selected from a group consisting of structures having the formulae (15), (16), (17), and (18):

$$R_1$$
 O O R_1 | | (15) -NH-CH-C-O-X-O-C-CH-NH-

$$-O-X-O-$$
 (17)

$$-NH-Y-NH-$$
 (18)

Q is a moiety selected from a group consisting of structures having the formulae (19), (20), and (21)

$$R_1$$
 O O R_1 | | (19) -NH-CH-C-O-Z-O-C-CH-NH-

$$\begin{array}{c|ccccc}
O & O \\
\parallel & \parallel \\
-O-R_2-C-NH-Z-NH-C-R_2-O-
\end{array}$$
(20)

M₁ is a moiety represented by the structure having the formula (22):

R₁ is hydrogen, methyl, *iso*-propyl, *sec*-butyl; *iso*-butyl, or benzyl group;

R₂ is methylene, methylmethylene, *n*-propylene, *iso*-propylene, ethylmethylene, *n*-butylene, *iso*-butylene, *sec*-butylene, or *n*-amylene group;

 R_3 is a straight chained or branched aliphatic alkylene group C_nH_{2n} , wherein n is an integer between 2 and 12;

X is a straight chained or branched aliphatic alkylene group C_nH_{2n} , wherein n is an integer between 2 and 12;

Y is a straight chained or branched aliphatic alkylene group $C_n H_{2n}$, wherein n is 1, 2, or 5; and

Z is a moiety derived from a compound selected from a group consisting of poly(ethylene glycol), poly(propylene glycol), random poly(ethylene glycol-co-propylene glycol), poly(ethylene glycol)-block-poly(propylene glycol), hyaluronic acid, poly(2-hydroxyethyl methacrylate), poly(3-hydroxypropylmethacrylamide), poly(styrene sulfonate), and poly(vinyl pyrrolidone, and cellulosics; and

m, n, and p are integers where the value of m is between 5 and 1,800, the value of n is between 1 and 800 and the value of p is between 4 and 1,500.

41. (Original) The method of Claim 40, wherein the copolymer is selected from a group consisting of copolymers of formulae (23), (24), (25), (26), (27), (28), (29), (30), (31), (32), (33), (34), (35), (36), (37), (38), (39), (40), (41), (42), and (43):

(23)

$$\begin{bmatrix} O & O & CH_3 & O & CH_3 \\ -C - CH_2 \end{bmatrix}_{2}^{U} - NH - CH - C - O - CH_2 \end{bmatrix}_{4}^{U} O - C - CH - NH$$

(24)

(25)

(26)

(27)

28)

(29)

$$= \begin{bmatrix} O & O & CH_3 & O & CH_3 \\ -C & -CH_2 \end{bmatrix}_{8} C - O - CH - C - NH + CH_2 \end{bmatrix}_{4} NH - C - CH - O \\ -C + CH_2 \end{bmatrix}_{8} \begin{bmatrix} O & O & CH_3 \\ -C & -CH_2 \end{bmatrix}_{8} C - O - PEG_{300} - O \\ -C + CH_2 \end{bmatrix}_{n} \begin{bmatrix} O & O & CH_3 \\ -C & -CH_2 \end{bmatrix}_{8} C - O - PEG_{300} - O \\ -C + CH_2 \end{bmatrix}_{n} \begin{bmatrix} O & O & CH_3 \\ -C & -CH_2 \end{bmatrix}_{8} C - O - PEG_{300} - O \\ -C + CH_2 \end{bmatrix}_{n} \begin{bmatrix} O & O & CH_3 \\ -C & -CH_2 \end{bmatrix}_{8} C - O - PEG_{300} - O \\ -C + CH_2 \end{bmatrix}_{n} \begin{bmatrix} O & O & CH_3 \\ -C & -CH_2 \end{bmatrix}_{n} \begin{bmatrix} O & O & CH_3 \\ -C & -CH_2 \end{bmatrix}_{n} C - O - PEG_{300} - O \\ -C + CH_2 \end{bmatrix}_{n} \begin{bmatrix} O & O & CH_3 \\ -C & -CH_2 \end{bmatrix}_{n} C - O - PEG_{300} - O \\ -C + CH_2 \end{bmatrix}_{n} \begin{bmatrix} O & O & CH_3 \\ -C & -CH_2 \end{bmatrix}_{n} C - O - PEG_{300} - O \\ -C + CH_2 \end{bmatrix}_{n} C - CH_2 C - CH_2$$

(30)

(31)

(34)

(35)

(36)

(37)

(38)

(39)

$$= \begin{bmatrix} O & O & CH_3 & O & O & CH_3 \\ \parallel & \parallel & \parallel & \parallel & \parallel \\ C - (CH_2)_4 & C - NH - CH - C - O - (CH_2)_4 & O - C - CH - NH \\ \end{bmatrix}_{0.37} \begin{bmatrix} O & O & CH_3 & O & O & CH_3 \\ \parallel & \parallel & \parallel & \parallel & \parallel \\ C - (CH_2)_4 & C - NH - CH - C - O - PEG_{300} & O - C - CH - NH \\ \end{bmatrix}_{0.67}$$

(40)

(41)

(42)

(43)